

CLAIMS

Having described the invention that which is claimed is:

1. An ultraviolet or electron beam curable silicone coating composition comprising:

(a) an epoxy-terminated linear silicone selected from the group consisting of $M^E D_x M^E$, $M^{GE} D_x M^{GE}$, $M^E D_x M^{GE}$ and mixtures thereof;

where $M^E = (C_6H_5O(CH_2CH_2)(CH_3)_2SiO_{1/2})$,

$M^{GE} = (CH_2(O)CH)O(CH_2)_3(CH_3)_2SiO_{1/2}$

and $D = (CH_3)_2SiO_{2/2}$

and $x = 0$ or a positive integer wherein said epoxy-terminated silicone polymer has a viscosity ranging from about 10 to about 1000 centistoke at 25°C.

(b) a mono- or poly-carbinol – terminated linear silicone selected from the group consisting of $M^{ROH} D_y M^{ROH}$ and mixtures thereof;

where M^{ROH} is selected from the group consisting of $HO(CH_2)_3(CH_3)_2SiO_{1/2}$, $(HOCH_2)_2(C_2H_5)C-O-(CH_2)_3(CH_3)_2SiO_{1/2}$, and $HOCH_2(HO)CHCH_2-O-(CH_2)_3(CH_3)_2SiO_{1/2}$ where $y = 0$ or a positive integer wherein said mono- or poly- carbinol – terminated silicone polymer has a viscosity ranging from about 50 to about 5000 centistoke at 25°C.

(c) an effective amount of a bis(alkylphenyl) or alkylphenyl(phenyl) or alkoxyphenyl(phenyl) or bis (alkoxyphenyl) iodonium salt photocatalyst, said photocatalyst being selected from the salts of the group of acids including hexafluoroantimonic acid, hexafluoroarsenic acid, hexafluorophosphoric acid, tetrafluoroboric acid, tetra(perfluorophenyl)boric acid and mixtures thereof

(d) an alkylphenol compound selected from the group consisting of R is an independently selected monovalent hydrocarbon radical selected from group consisting of C1 to C60 straight alkyl, C3 to C60 branched chain alkyl, C2 to C60 straight chain alkenyl, and C3 to C60 branched chain alkenyl radicals where said R groups may be alpha-, beta- or gamma- to the phenolic OH functionality, and where b = 1, 2, 3, 4, or 5.

2. The composition of claim 1 wherein component (a) ranges from about 50 to about 95% of the composition comprising components (a), (b), (c), and (d) and wherein component (b) ranges from about 2 to about 49% of the composition comprising components (a), (b), (c), and (d), and wherein component (c) ranges from about 0.1 to about 2.5% of the composition comprising components (a), (b), (c), and (d), and wherein component (d) ranges from about 0.5 to about 10% of the composition comprising components (a), (b), (c), and (d).

3. The composition of claim 1 wherein component (a) ranges from about 75 to about 95% of the composition comprising components (a), (b), (c), and (d) and wherein component (b) ranges from about 5 to about 25% of the composition comprising components (a), (b), (c), and (d), and wherein component (c) ranges from about 0.5 to about 2% of the composition comprising components (a), (b), (c), and (d), and wherein component (d) ranges from about 1 to about 5% of the composition comprising components (a), (b), (c), and (d).

4. The composition of claim 1 wherein component (a) ranges from about 80 to about 95% of the composition comprising components (a), (b), (c), and (d) and wherein component (b) ranges from about 5 to about 20% of the composition comprising components (a), (b), (c), and (d) and wherein component (c) ranges from about 0.5 to about 1% of the composition comprising components (a), (b), (c), and (d) and wherein component (d) ranges from about 2 to about 5% of the composition comprising components (a), (b), (c), and (d).

5. The composition of claim 1 wherein the epoxy-terminated silicone is $\text{M}^{\text{E}} \text{D}_x \text{M}^{\text{E}}$.

6. The composition of claim 5 wherein component (a) ranges from about 50 to about 95% of the composition comprising components (a), (b), (c), and (d) and wherein component (b) ranges from about 2 to about 49% of the composition comprising components (a), (b), (c), and (d), and wherein component (c) ranges from about 0.1 to about 2.5% of the composition comprising components (a), (b), (c), and (d), and wherein component (d) ranges from about 0.5 to about 10% of the composition comprising components (a), (b), (c), and (d).

7. The composition of claim 5 wherein component (a) ranges from about 75 to about 95% of the composition comprising components (a), (b), (c), and (d) and wherein component (b) ranges from about 5 to about 25% of the composition comprising components (a), (b), (c), and (d), and wherein component (c) ranges from about 0.5 to about 2% of the composition comprising components (a), (b), (c), and (d), and wherein component (d) ranges from about 1 to about 5% of the composition comprising components (a), (b), (c), and (d).

8. The composition of claim 5 wherein component (a) ranges from about 80 to about 95% of the composition comprising components (a), (b), (c), and (d) and wherein component (b) ranges from about 5 to about 20% of the composition comprising components (a), (b), (c), and (d) and wherein component (c) ranges from about 0.5 to about 1% of the composition comprising components (a), (b), (c), and (d) and wherein component (d) ranges from about 2 to about 5% of the composition comprising components (a), (b), (c), and (d).

9. The composition of claim 1 wherein the epoxy-functional silicone is $M^{GE} D_x M^{GE}$

10. The composition of claim 9 wherein component(a) ranges from about 50 to about 95% of the composition comprising components (a), (b), (c), and (d) and wherein component (b) ranges from about 2 to about 49% of the composition comprising components (a), (b), (c), and (d), and wherein component (c) ranges from about 0.1 to about 2.5% of the composition comprising components (a), (b), (c), and (d), and wherein component (d) ranges from about 0.5 to about 10% of the composition comprising components (a), (b), (c), and (d).

11. The composition of claim 9 wherein component (a) ranges from about 75 to about 95% of the composition comprising components (a), (b), (c), and (d) and wherein component (b) ranges from about 5 to about 25% of the composition comprising components (a), (b), (c), and (d), and wherein component (c) ranges from about 0.5 to about 2% of the composition comprising components (a), (b), (c), and (d), and wherein component (d) ranges from about 1 to about 5% of the composition comprising components (a), (b), (c), and (d).

12. The composition of claim 9 wherein component (a) ranges from about 80 to about 95% of the composition comprising components (a), (b), (c), and (d) and wherein component (b) ranges from about 5 to about 20% of the composition comprising components (a), (b), (c), and (d) and wherein component (c) ranges from about 0.5 to about 1% of the composition comprising components (a), (b), (c), and (d) and wherein component (d) ranges from about 2 to about 5% of the composition comprising components (a), (b), (c), and (d).

13. The composition of claim 1 wherein the carbinol-terminated silicone is $M^{ROH} D_y M^{ROH}$.

14. The composition of claim 13 wherein component (a) ranges from about 75 to about 95% of the composition comprising components (a), (b), (c), and (d) and wherein component (b) ranges from about 5 to about 25% of the composition comprising components (a), (b), (c), and (d), and wherein component (c) ranges from about 0.5 to about 2% of the composition comprising components (a), (b), (c), and (d), and wherein component (d) ranges from about 1 to about 5% of the composition comprising components (a), (b), (c), and (d).

15. The composition of claim 13 wherein component (a) ranges from about 75 to about 95% of the composition comprising components (a), (b), (c), and (d) and wherein component (b) ranges from about 5 to about 25% of the composition comprising components (a), (b), (c), and (d), and wherein component (c) ranges from about 0.5 to about 2% of the composition comprising components (a), (b), (c), and (d), and wherein component (d) ranges from about 1 to about 5% of the composition comprising components (a), (b), (c), and (d).

16. The composition of claim 13 wherein component (a) ranges from about 80 to about 95% of the composition comprising components (a), (b), (c), and (d) and wherein component (b) ranges from about 5 to about 20% of the composition comprising components (a), (b), (c), and (d) and wherein component (c) ranges from about 0.5 to about 1% of the composition comprising components (a), (b), (c), and (d) and wherein component (d) ranges from about 2 to about 5% of the composition comprising components (a), (b), (c), and (d).

17. The composition of claim 1 wherein the carbinol-terminated silicone is $M^{(ROH)_2} D_y M^{(ROH)_2}$

18. The composition of claim 17 wherein component (a) ranges from about 50 to about 95% of the composition comprising components (a), (b), (c), and (d) and wherein component (b) ranges from about 2 to about 49% of the composition comprising components (a), (b), (c), and (d), and wherein component (c) ranges from about 0.1 to about 2.5% of the composition comprising components (a), (b), (c), and (d), and wherein component (d) ranges from about 0.5 to about 10% of the composition comprising components (a), (b), (c), and (d).

19. The composition of claim 17 wherein component (a) ranges from about 75 to about 95% of the composition comprising components (a), (b), (c), and (d) and wherein component (b) ranges from about 5 to about 25% of the composition comprising components (a), (b), (c), and (d), and wherein component (c) ranges from about 0.5 to about 2% of the composition comprising components (a), (b), (c), and (d), and wherein component (d) ranges from about 1 to about 5% of the composition comprising components (a), (b), (c), and (d).

20. The composition of claim 17 wherein component (a) ranges from about 80 to about 95% of the composition comprising components (a), (b), (c), and (d) and wherein component (b) ranges from about 5 to about 20% of the composition comprising components (a), (b), (c), and (d) and wherein component (c) ranges from about 0.5 to about 1% of the composition comprising components (a), (b), (c), and (d) and wherein component (d) ranges from about 2 to about 5% of the composition comprising components (a), (b), (c), and (d).

21. The composition of claim 1 wherein the photocatalyst is a bis(alkylphenyl) iodonium hexafluoroantimonate.

22. The composition of claim 1 wherein the alkylphenol is 4-dodecylphenol.

23. An ultraviolet or electron beam curable silicone coating composition consisting essentially of:

(a) an epoxy-terminated linear silicone selected from the group consisting of $M^E D_x M^E$, $M^{GE} D_x M^{GE}$, and mixtures thereof;

where $M^E = (C_6H_9O(CH_2CH_2)(CH_3)_2SiO_{1/2})$,

$M^{GE} = (CH_2(O)CH)O(CH_2)_3(CH_3)_2SiO_{1/2}$

and $D = (R^1)_2SiO_{2/2}$

and $x = 0$ or a positive integer wherein said epoxy-terminated silicone polymer has a viscosity ranging from about 10 to about 1000 centistoke at 25°C and R^1 is a C1 to C60 monovalent hydrocarbon radical.

(b) a mono- or poly-carbinol – terminated linear silicone selected from the group consisting of $M^{ROH} D_y M^{ROH}$ and mixtures thereof;

where M^{ROH} is selected from the group consisting of $HO(CH_2)_3(CH_3)_2SiO_{1/2}$, $(HOCH_2)_2(C_2H_5)C-O-(CH_2)_3(CH_3)_2SiO_{1/2}$, and $HOCH_2(HO)CHCH_2-O-(CH_2)_3(CH_3)_2SiO_{1/2}$ where $y = 0$ or a positive integer wherein said mono- or poly- carbinol - terminated silicone polymer has a viscosity ranging from about 50 to about 5000 centistoke at 25°C.

(c) an effective amount of a bis(alkylphenyl) or alkylphenyl(phenyl) or alkoxyphenyl(phenyl) or bis (alkoxyphenyl) iodonium salt photocatalyst, said photocatalyst being selected from the salts of the group of acids including hexafluoroantimonic acid, hexafluoroarsenic acid, hexafluorophosphoric acid, tetrafluoroboric acid, and

(d) alkylphenol compounds selected from the group consisting of $R_b-C_6H_{5-b}-OH$ where R = a straight chain or branched chain saturated or unsaturated hydrocarbon ranging in stoichiometry from CH_3- to about $C_{30}H_{61}$, and where said alkyl groups may be alpha-, beta-, or gamma- to the phenolic OH function, and where b is an integer ranging from 1 to 5.